Remarks:

Invention relates specifically to tube amplifiers

The disclosed invention relates to a specific use in combination with overdriven tube amplifiers although it can be implemented with solid-state technology as well. Tube amplifier performance can be severely impaired if impedance mismatch occurs and the output stage of a tube amplifier can be easily destroyed if it is short-circuited, even if that happens in just a partition of the applied frequencies spectrum.

Invention relates to "sound sensitive" circuits

The disclosed invention relates to the use with a musical instrument. It is of crucial functional value and importance that the dynamics and the sound of an electric instrument represented by its amplified signal must not be altered. This occurs if the proportions of frequencies within such a signal are being changed and object of the present invention is to provide a circuit that maintains constant tonal quality within its entire control range.

Invention relates to a narrow but crowded segment of prior art

Post-power amp attenuation of amplified musical instrument signals in use especially with tube type guitar amplifiers is a very specific yet very advanced technical field. Various attempts to accomplish the implementation of a satisfying circuit have so far been made throughout the past 25 years. www.amptone.com provides a good overview over the present stage of development. Applicant is

familiar with a variety of current common products and has owned or tested most of them.

Prior art would have implemented combination of references if obvious

If a combination of the elements shown in the references Scholz, Lowell and Gonzalez would have been obvious to the ones skilled in the art, such a combination would then have been made already by those skilled in the art because it solves two major problems that occur in this technology and are not solved by the state of the art at present.

Importance of a continuous dial

Post-power amp attenuation represents a specific field of volume control. Object of a good volume control should generally be to provide a continuous volume control dial. Scholz' first approach in 1979 (pat-# 4,363,934) was a circuit with continuous volume control which failed because impedance mismatch occurred and could not be tolerated with the use of tube power amps. A second approach, as represented in the reference above and further called "Scholz", implements a circuit that contains the unsatisfactory compromise of an incremental dial. This is still the industry standard.

Prior art has not been able to provide continuous dial

Almost every currently available post power amp volume control unit in the prior art represents a further modification of the original Scholz design and features an incremental dial.

Prior art teaches away from combination of Scholz, Lowell and Gonzalez

Many modifications in the prior art have been made to the original design of Scholz throughout the past 20 years in attempts to improve its poor sound quality. This is mainly being made by adding elements such as capacitors or/and small inductors to the chain of resistors in the original design of Scholz.

Gonzales provides neither constant frequencies nor constant impedance

Connecting an autotransformer or Variac across the output terminals of a tube amplifier as Gonzalez does is highly unsafe and most certainly results in severe damage of the amplifier. One truly skilled in the art would certainly never wire up a variac in such a way to a power amp output or seriously consider using this as an approach in order to maintain post-power amp volume control. The results of Gonzales' "experiment" are impedance mismatch (Gonzalez, line 6 and 7), alteration of tone (Gonzalez, line 8) and possible short circuit and eventual destruction of power amp output stage (Gonzales, line 10 and 11).

Scholz does not provide constant frequencies

On page 6, line 1, 2 and 3 the office action describes the design of Scholz as being able to maintain "constant proportional quality of high frequencies in applied sound signals (inherently)". This is unfortunately not the case and well known in the art, as for example stated in reference V, line 27 and 28: "The loss of highs is noticeable after about 9-12db." It also can be shown in a physical equation according to the laws of Ohm and Kirchhoff. (See appendix A, section I)

Lowell does not provide constant impedance

The design of Lowell cannot be applied to tube amplifiers. Using an autotransformer as post-power amp volume control in such a way results in impedance mismatch and, if controller is set to node 82, short-circuiting the amplifier output stage. This might be tolerable for solid-state power amplifiers but would lead to instant or long-term destruction or damage of a tube amplifier.

Combination of Lowell and Scholz

If in an assumed combination of Scholz and Lowell the resistors of Scholz would

have been replaced with autotransformers or partitions of a single autotransformer coil, or, from another perspective, the autotransformer of Lowell would have been rewired according to the teachings of Scholz, this would have led to an exclusively inductive circuit. Even if the coil partitions would have been selected at values that enable maintenance of constant input impedance, such a circuit could not maintain constant proportional quality of high frequencies. At low frequencies the loudspeaker impedance would be dominant and at higher frequencies the transformer would be, thus dissipating more highs than lows. The audible signal would be damped in the highs accordingly. (See appendix A, section II)

Invention provides constant frequencies and constant impedance

The circuit of the present invention combines resistive and inductive elements in a very specific and novel way. Object of the present invention is to provide an attenuation circuit which as a prerequisite maintains the input impedance at relatively constant value, but which also is frequency independent in first order and thereby capable of maintaining all applied frequencies at constant values as the attenuation factor is varied. The initial approach of designing this circuit is to maintain the sound and simultaneously provide attenuation. In order to achieve this quality, the resistive and inductive elements have to be chosen at certain determined values, which substantially differ from any prior art. The transformer and the loudspeaker impedance should be in approximate proportional relation with each other and the resistive impedance element must be significantly larger than the transformer impedance. (See appendix A, section III)

Invention provides continuous dial

Object of the present invention is to provide an effective and true-frequency post-power amp attenuation circuit. Because of the significant and novel combination

of a variac and a resistor, this circuit for the first time enables the implementation of a continuous dial.

Not a suggested modification of Scholz

Although the design of Scholz can be considered as a classic in post-power amp attenuation, there is no suggestion in the prior art to modify this particular circuit in a radical manner. If the present invention is related to the teachings of Scholz, there are very significant and obvious differences. In column 4, lines 5-8 Scholz requires the total series resistance of first impedance means RB and loudspeaker RS (ZS) to be less or equal than resistor string R0 and resistors R1 and R2. The design of the present invention requires an inductive resistance Z0 that is in good approximate proportion to loudspeaker ZS (RS) and first impedance means R1, which needs to be substantially larger than the inductive resistance Z0. If RB in Scholz is related to R1 and R0 in Scholz is related to Z0, furthermore given that both designs are related to a similar loudspeaker, in the circuit of the present invention the total series resistance of first impedance means R1 and loudspeaker significantly exceed Z0, therefore substantially differing from the requirement as of Scholz to be less or equal than R0.

References have not yet been combined in the prior art and do not suggest combination

Unless taught by the present invention, there are no apparent necessities to combine a transformer and a resistive element in a power attenuation circuit. Autotransformers are far more expensive than resistors and the prior art does not teach such a substitution, give any reason to implement it or show examples of such a design.

Omission of elements

The circuit design of the present invention comprises just two elements, thus being by far advantageous over the prior art in yet another aspect. It is extremely easy to build and works for the most common range of loudspeakers (8Ohm, 16Ohm).

Synergism

The circuit design of the present invention provides a combination of qualities and features, which make it far superior over the prior art.

- Safe power attenuation circuit for tube amplifier systems
- Continuously dialed volume control
- Constant tonal quality (no frequency dependence in first order)
- Simple but very effective, two-part design, easy to build
- Controlled heat dissipation in mainly one component
- Space-efficient, can be built entirely into amplifier chassis

Industry approval (Fender, THD, Hughes & Kettner and others)

Applicant has previously presented a prototype unit to the industry. Given a black-box demonstration in 2001, the world market leader in musical instrument amplification, Fender Corporation, has expressed serious interest in licensing (see Appendix B, I-III). Further presentations have been made to the industry, including the German market leading company Hughes and Kettner and the manufacturer of the "Hotplate", THD, which then also have expressed interest in licensing. So far players and manufacturers have entirely reacted positively and applicant feels encouraged to found a US company based on this product.

Previous failure of others

Since the implementation of post-power amp volume control in the late 1970's it has been a goal for those skilled in the art to achieve continuously adjustable

control without changing the tone of the instrument as the attenuation factor is varied and without risking damage to the amplifier. This has never been achieved before by the prior art. The present invention fulfills all these requirements and will, once introduced to the market, make a significant difference for players/users.

Conclusion

The present invention comprises a novel and effective electric circuit, related to a narrow and specific prior art. Although seemingly simple in retrospect, this special combination of just two electronic elements for a very specific purpose provides manifold solutions to the essential problems in the related field and in its scope certainly goes beyond an ordinary combination of its features. Therefore it is submitted that patentable subject matter is clearly present. If the examiner agrees but does not feel that the present claims are technically adequate, applicant respectfully requests that the examiner write acceptable claims pursuant to MPEP 707.07(j). The disclosed invention is based on thorough research and testing. It has been reduced to practice and prototypes have achieved many positive reactions among users and those skilled in the art of making musical instrument amplifiers.

Request for constructive assistance

Applicant once again very respectfully and kindly requests the constructive assistance and suggestions of the examiner in order that this application can be placed in allowable condition without the need for further proceedings.

Very respectfully,

Gunnar Flentje-Larsson .....Applicant

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I certify that on the date below I will fax this communication, and attachments if any, to group **2644** of the Patent and Trademark Office at the following number:

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2004 May 18.....

Gunnar Flentje-Larsson, applicant